
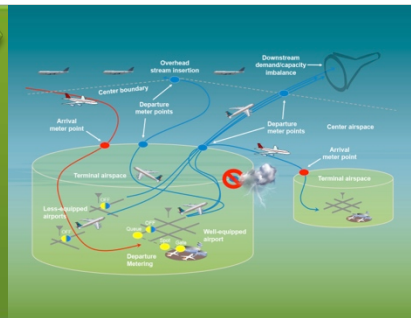



NASA's work on these technologies	Efficient Descent Advisor (EDA) <ul style="list-style-type: none"> Provides speed and path advisories to save time and fuel in arrivals descents from En Route airspace to runway United Airlines, DEN, FAA and Denver Air Route Traffic Control Center 	Transferred to FAA—Jan 2012		<ul style="list-style-type: none"> Transferred to FAA in Jan 2012 Operational in Albuquerque Center in 2014 Potential FAA deployment 2018 	Product Benefits <ul style="list-style-type: none"> \$143M / year savings improved meter-fix delivery accuracy \$46M / year savings reduced fuel burn in en route airspace 60% reduction in metering related clearances
NASA's work on these technologies	ATD-1: Terminal Sequencing & Spacing Tool (TSAS) <ul style="list-style-type: none"> Advanced scheduling and sequencing of arrivals and runway Terminal controller advisories to maintain precision schedules American Airlines (formerly US Airways), FAA 	Transferred to FAA—July 2014		<ul style="list-style-type: none"> TSAS transferred to FAA July 2014 Deployment early 2019 on STARS system 	Product Benefits <ul style="list-style-type: none"> \$300-\$400M / year savings increased throughput >90% PBN conformance during high density, mixed equipage arrival operations improving fuel and operational efficiency
NASA's work on these technologies	ATD-1: Flightdeck Interval Management (FIM) <ul style="list-style-type: none"> Speed advisories for airborne precision spacing United Airlines, Boeing, Honeywell, FAA and ACSS 	Flight Test Feb 2017		<ul style="list-style-type: none"> FIM Flight Test Feb 2017 Transfer to FAA in 2017 	Product Benefits <ul style="list-style-type: none"> Improved delivery accuracy during high density arrival operations improving throughput and reducing passenger delay

NASA's work on these technologies	<p>Precision Departure Release Capability (PDRC)</p> <ul style="list-style-type: none">Precision release of tactical departures for efficient en route stream merge; Analogous to cars merging onto a busy freewayAmerican Airlines, DFW and FAA	Transferred to FAA—Jan 2013		<ul style="list-style-type: none">Tested at DFWTransferred to FAA in July 2013	Product Benefits	<p>50% increase in departure time conformance</p> <p>\$20M / year savings to airlines from increased en route slot merge compliance</p>
NASA's work on these technologies	<p>ATD-2: Integrated Arrival/Departure/Surface (IADS)</p> <ul style="list-style-type: none">Improves predictability and operational efficiency in metroplex environment, including arrival, departure and surface prediction, scheduling and managementAmerican Airlines, CLT, FAA and NATCA	Status			Product Benefits	<p>40% reduction in overall departure delay (estimate)</p> <p>\$8.2B potential savings over 20-year lifecycle (estimate)</p> <p>Enables flights to absorb delays at the gate with less fuel burn and emissions</p>

Lab-to-Field

NASA's work on these technologies	ATD-3: Dynamic Weather Reroutes (DWR) <ul style="list-style-type: none"> Recovers delay caused by static weather reroute plans in En Route environment American Airlines Integrated Operations Center (IOC), DFW and FAA 	Status		<ul style="list-style-type: none"> Operational testing in AA IOC since July 2012 Will be extended to develop ATD-3 and transfer to FAA 	Product Benefits	<p>Analysis indicates potential savings of about 100,000 flying minutes for 15,000 flights, or about 6.7 minutes/flight on average</p> <p><i>Note: Analysis of all Fort Worth Center traffic in 2013, excluding arrivals to the major Dallas airports, Dallas-Fort Worth International (DFW) and Dallas Love Field (DAL).</i></p>
NASA's work on these technologies	ATD-3: Traffic Aware Strategic Aircrew Requests (TASAR) <ul style="list-style-type: none"> Pilot onboard automation tool to optimize aircraft's trajectory Leverages networked connectivity to real-time operational data Flight test partners Alaska Airlines and Virgin America 	Status		<ul style="list-style-type: none"> NASA flight test in 2015 Integration with airlines in 2016 Operational testing in airline fleets 2017-2018 	Product Benefits	<p>Optimizes to save time or fuel; Projections for carriers optimized for (12 representative city pairs)</p> <ul style="list-style-type: none"> Time, 4.2 minutes Fuel, 575 pounds Increases ATC approvability through ADS-B IN data